IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | |
|---|---|
| Application of: | Docket No. 32357 |
| CARNES, CORRIE L. et al. | Confirmation No. 8602 |
| Serial No. : 10/074,932 | Group Art Unit No. 1754 |
| Filed: February 11, 2002 | |
| HIGH SURFACE AREA MIXED METAL OXIDES | Examiner: BOS, Steven J |

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 C.F.R. 1.132

1. I, Dr. Olga Koper, am Vice President of Technology and Technical Services for NanoScale Materials, Inc., Manhattan, Kansas, a company that conducts applied research in the area of reactive nanoparticles and related technologies. In addition, I am a named inventor on at least 10 patents relating to various nanoparticulate materials.

2. As an expert in the field of nanoparticulate materials, I have been asked by the applicants and assignee of the above application to opine on the teachings of several references cited in the office action dated April 14, 2006.

3. The claims of the present application are directed toward particulate compositions generally comprising at least two different nanocrystalline materials selected from the oxides and hydroxides of certain element groups and series of the CAS Periodic Table. The different materials are co-solidified with one of the materials forming a matrix in which the at least one other material is dispersed and intimately intermingled. One of the materials exhibits an average

crystallite size of up to about 4 nm by XRD analysis, and the composition presents a surface area of between 135-834 $m^2/g$.

4. One reference cited in the April 14, 2006, office action is U.S. Patent No. 4,542,112. It is my opinion that the materials formed by the process disclosed in the '112 patent would not possess all of the characteristics of the materials claimed in the present application, especially the claimed crystallite size and surface area.

5. The '112 patent teaches that the spinel fine powders are produced from precipitates formed by hydrolysis of a solution of magnesium alkoxide and aluminum alkoxide. The precipitates formed by hydrolysis of the solution are heated to a temperature between 700°C and 1200°C in order to crystalize the hydroxides. The heat treatment step provides energy to the atoms them to move, interact, and align into larger spinel crystals having crystallite sizes of between 20-40 nm and higher. This is a common occurrence that is called sintering. It is important to note that sintering does not affect the size of the particles, but rather the size of the crystallites making up the particles. Thus, the materials formed by the process disclosed in the '112 patent would not exhibit an average crystallite size of up to about 4 nm by XRD analysis, but would have crystallite sizes of between 20-40 nm and higher.

6. The '112 patent also teaches in Table 1 that the spinel materials produced exhibit surface areas ranging between 55-95 $m^2/g$, significantly lower than the range claimed in the present application.

7. Furthermore, testing conducted under my supervision on the materials of the present invention demonstrated a lack of spinel formation upon heat treatment at a temperature of 700°C. Therefore, it is my opinion that the materials formed according to the process of the '112 patent would not inherently possess all characteristics of the materials being claimed in the present

application.

8. Another reference cited in the April 14, 2006, office action was U.S. Patent No. 5,573,582. The '582 patent is directed toward a process for preparing a fine-particulate metal hydroxide comprising aluminum hydroxide as a major component. The process comprises the step of calcining the metal hydroxide at 500-1500°C.

9. As with the heat treatment step discussed above in reference to the '112 patent, the calcining step of the '582 patent causes the molecules of the hydroxide crystallites to move, interact, and align into larger crystals. It is my opinion that the calcining step would result in the formation of particles having crystallite sizes of at least 20 nm and higher. Given the larger crystallite sizes, I also believe that the particles made according to the '582 patent would have surface areas well below the claimed surface area range in the present application, likely not exceeding 100 $m^2/g$. Thus, it is my opinion that the materials formed according to the process of the '582 patent would not inherently possess all characteristics of the materials being claimed in the present application.

10. The final reference cited in the April 14, 2006, office action was PCT Publication WO 00/38282. This reference generally teaches doped, nanosized metal oxide particles that exhibit stimulated emission and continuous-wave laser action when energized by electron beams.

11. The only measured surface areas for the materials of the '282 publication were found to be between 43.2 $m^2/g$ and 79.5$m^2/g$ (see, Examples 3 and 9), well below the presently claimed surface area range. Furthermore, the '282 publication is not concerned with maximizing the surface area of the particles described therein, only that the particles emit certain wavelengths of light upon being exposed to an excitation source.

12. In sum, it is my opinion that none of the materials taught by any of the three

references discussed above possess all of the properties that are being claimed in the present application.

13. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

__/Olga Koper/_____
Olga Koper, Ph. D.